

(19) World Intellectual Property  
Organization  
International Bureau



(43) International Publication Date  
29 December 2004 (29.12.2004)

PCT

(10) International Publication Number  
**WO 2004/113945 A2**

(51) International Patent Classification<sup>7</sup>: **G01R 33/20**

(21) International Application Number:  
PCT/IB2004/050938

(22) International Filing Date: 21 June 2004 (21.06.2004)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:  
03101856.7 24 June 2003 (24.06.2003) EP

(71) Applicant (for all designated States except US): **KONINKLIJKE PHILIPS ELECTRONICS N.V. [NL/NL];**  
Groenewoudseweg 1, NL-5621 BA Eindhoven (NL).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **KLEIHORST, Robert, P. [NL/NL];** c/o Prof. Holstlaan 6, NL-5656 AA Eindhoven (NL). **WARNTJES, Jan, B., M. [NL/NL];** c/o Prof. Holstlaan 6, NL-5656 AA Eindhoven (NL).

(74) Agent: **WOLFS, Marc, J., M.;** Prof. Holstlaan 6, NL-5656 AA Eindhoven (NL).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

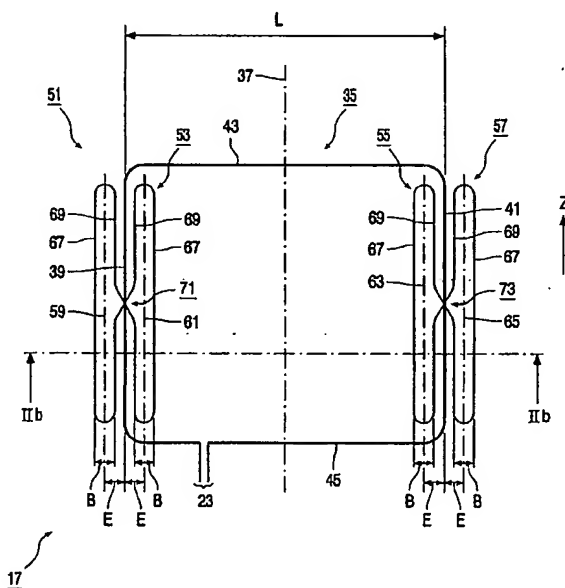
(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

**Declaration under Rule 4.17:**

— as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii)) for the following designations AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ,

[Continued on next page]

(54) Title: A RADIO-FREQUENT COIL SYSTEM FOR USE IN A MAGNETIC RESONANCE IMAGING SYSTEM



(57) Abstract: The invention relates to a radio-frequency (RF) coil system (17, 17') for use in a magnetic resonance imaging (MRI) system. The RF coil system comprises at least one main coil (35) for transmitting an RF magnetic field ( $B_1$ ) into and/or receiving an RF magnetic field ( $B_1'$ ) from an examination volume (3) of the MRI system. The main coil has a main coil axis (37), which is or is to be oriented parallel to a main magnetic field ( $B_0$ ) in the examination volume, and at least one electrical conductor (39, 41) which extends mainly parallel to the main coil axis. According to the invention, the RF coil system comprises at least two electrical auxiliary coils (51, 53, 55, 57) which are assigned to said conductor of the main coil. The auxiliary coils are arranged on opposite sides of said conductor of the main coil. Each auxiliary coil has a coil axis (59, 61, 63, 65) which extends substantially parallel to the main coil axis at a distance from the conductor of the main coil to which the respective auxiliary coil is assigned, said distance being small relative to a main dimension (L) of the main coil. The auxiliary coils constitute passive electrical coils in which electrical currents are generated under the influence of an RF magnetic field ( $B_{11}$ ,  $B_{11}'$ ) present at the location of the auxiliary coils. The RF magnetic

field ( $B_{12}$ ,  $B_{34}$ ) generated by the auxiliary coils as a result of said currents in the auxiliary coils suppresses said RF magnetic field present at the location of the auxiliary coils. Thus, the auxiliary coils provide a sensitivity reducing effect of the RF coil system in local regions (47, 49) which are at relatively small distances from the conductor of the main coil. For regions at a distance from the conductor of the main coil comparable to the main dimension of the main coil, said sensitivity reducing effect is negligible.

WO 2004/113945 A2



CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VC, VN, YU, ZA, ZM, ZW, ARIPO patent (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE,

IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG)

**Published:**

— without international search report and to be republished upon receipt of that report

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.